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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/484,437

01/18/2000

Tongbi Jiang

M4065.0226/P226

9698

24998 7590 03/12/2007

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EXAMINER

MITCHELL, JAMES M

ART UNIT

PAPER NUMBER

2813

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

03/12/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

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## Office Action Summary

Application No.

09/484,437

Applicant(s)

JIANG, TONGBI

Examiner

James M. Mitchell

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3,6-9,11,12,14,16-20,34,36,38-42,46 and 51 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,6-9,11,12,14,16-20,34,36,38-42,46 and 51 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### DETAILED ACTION

This office action is in response to applicant's amendment filed December 20, 2006.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 6-9, 11, 12, 14, 16-20 and 34, 35, 38-42, 46 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amagai (U.S. 6,23,661)<sup>1</sup> in combination with Forray (U.S. 2002/0062923).

Amagai (Fig.3) discloses:

(cl.1) a prepackaged semiconductor device (examined to be prior to being encapsulated (Col. 5, Lines 52-55) assembly comprising: a solder mask (8) over a substrate (3), a die (2), conductive paths (5) connecting contacts on said die with contacts (4) in said substrate (via within perimeter portion of substrate) and a adhesive layer (e.g. above 8 not labeled) between said die and said solder mask;

(cl. 3, 51) said prepackaged assembly encapsulated (9) over the assembly and said adhesive is fully cured (e.g. encapsulant after chip attachment; Col. 5, Lines 52-55, see footnote 4)

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<sup>1</sup> Likewise any one of the newly cited art could have been used to provide basis for an obvious type rejection, since they show generally the claimed invention comprising a chip mounted on a soldermask over a substrate with an adhesive.

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(cl.38) subsequent processing is wirebonding (5) connecting contacts (e.g. point where wire connects to die, not labeled) and contact (e.g. 4) on substrate;

(cl. 41, 46) wherein said adhesive contacts mutually facing surfaces of said die and said solder mask (Fig. 3);

Amagai does not appear to disclose a partially-cured adhesive layer, the adhesive is a resin bismaleimide with a glassy temperature about 20-50 degrees with initiators, that said contacts are substantially free of contaminants outgassed from said solder mask, or that the partially cured adhesive has an adhesive strength sufficient to hold a die to a solder mask during subsequent package assembly processing that includes wirebonding, or that the adhesive is more impervious to affects of outgassing or is cross-linked.

However, Forray utilizes an adhesive with a glassy temperature between 20 to 50 degrees Celsius via a resin bismaleimide and further discloses a bismaleimide that is only **partially cured** adhesive (e.g. intermediate phase at point where material begins to cure then there's a portion that's not cured; Par. 0065, Table) with a semiconductor device that remains voidless after outgassing<sup>2</sup> (Abstract: "reduced void formation upon *curing*"; Paragraph 0048) and therefore adhesive is more impervious to affects of outgassing (e.g. zero voids discloses in table; Par. 0065, paste F), and is at least partially cured ( e.g. see Table 1, F; Par. 0007, Lines 6-8) and partially crosslinked (e.g. Par. 0065, Table Paste F; cure peak is 99.16) and therefore fully crosslinked, wherein

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<sup>2</sup> Applicant's claim 45 only defines a natural phenomenon with outgassing (e.g. voids that trap moisture), but do not impart patentability, since patentability of a product is imparted by its structure. In this instance, since the claim an its independent claims broadly encompass an adhesive with no voids, further

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the adhesive is inherently cured at a temperature between 20 to 50 degrees higher than glassy temperature ( $T_g$ ) of said adhesive layer (admittedly by applicant, Page 6, bismaleimide  $T_g$  is 5-10 degree Celsius); and said adhesive contains an initiators (Par. 0028, Lines 9-10) which reacts at a temperature about 100 degree Celsius, and has an adhesive strength sufficient to hold a die to a solder mask (i.e. no additional adhesive is used) during subsequent package assembly processing (Par. 0065, Table; e.g. the heating process between the onset cure temperature and cure peak is a subsequent package assembly process) that includes wirebonding (Par. 0065).

It would have been obvious to one of ordinary skill in the art to form the adhesive of Amagai utilizing the attaching steps, adhesive of Forray and its characteristics, in order to bond the chip and to eliminate void formation in the adhesive during a cure process as taught by Forray (Abstract; Par. 0047-0049) thereby providing contacts free from contaminants (via limited outgassing because no voids formed in adhesive)<sup>3</sup>.

With respect to the process limitation of claims 1-3, 6-9, 11-20 and 33-37, and 40 as exemplified by "molded" or "subsequent processing" are product by process claims. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself, the prior art structure is the same as the claimed invention. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior

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providing disadvantageous of outgassing does not add structural limitations, and therefore does not impart patentability.

<sup>3</sup> In addition, the selection of a known material based on its suitability for its intended use supported a

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product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

Furthermore, with respect to claims 1 and 12, the intended use limitation of "adhesive strength sufficient to hold said die to solder mask during subsequent package assembly processing [wirebonding]," does not result in a structural difference between the claimed apparatus and the apparatus of the prior art. Further, because the apparatus of the prior art, Forray, is inherently capable of being used for the intended use the statement of intended use does not patentably distinguish the claimed apparatus from the apparatus of prior art. Similarly, the manner in which an apparatus operates is not germane to the issue of patentability of the apparatus; Ex parte Wikdahl 10 USPQ 2d 1546, 1548 (BPAI 1989); Ex parte McCullough 7 USPQ 2d 1889, 1891 (BPAI 1988); In re Finsterwalder 168 USPQ 530 (CCPA 1971); In re Casey 152 USPQ 235, 238 (CCPA 1967). Also, "Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim."; Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969). And, claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danley, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does." Hewlett-Packard Co. v. Bausch & Lomb Inc., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990).

### ***Response to Arguments***

Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

In an effort to expedite prosecution, examiner has addressed some limitations that may be relevant.

First, applicant contends that that prior art does not disclose a pre-package due to the title. Examiner is unpersuaded, because it well known that applicants can be their own lexicographers. The fact that the prior art fails to recite a structure as pre-packaged does not preclude it from still disclosing that feature. In particular, applicant in his remarks page 6 suggests that pre-packaged simply means it is without an encapsulant. Since Amagai indicates that its chip attachment is done prior to an encapsulation it discloses features (e.g. features concerning chip and adhesive) in a pre-packaged stage.

Secondly, applicant claims that examiner is wrong in treating partially cured as a process limitation, and that the prior art fails to show an adhesive partially cross-linked affixing the die to the mask, since Forray allegedly only shows a one-step cure. Without either agreeing or disagreeing to the one-step statement, even assuming there was only a one step process, because the curing process taught in Forray includes a range, it encompasses an intermediate point in time where its structure includes a chip affixed by a partially cross-linked adhesive as claimed by applicant. While applicant's arguments appear mostly drawn to process limitations (e.g. partially-cured...allow for further curing), he has yet to draw a structural difference not encompassed by the prior art (for

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example, an encapsulating resin material surrounding a chip attached to the mask with a partially cured adhesive<sup>4</sup>).

Last, applicant contends that a prima facie case of obviousness has not been met, because examiner has not provided a motivation. Examiner respectfully disagrees and has on several occasions noted the benefit/motivation for using Forray's adhesive, which is to eliminate potential outgassing.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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<sup>4</sup> Note that claim 51 recites the process limitation of the "adhesive is fully cured." The structure produced is a chip attached with a fully cured adhesive that's encapsulated, which is encompassed by the prior art. As a product claim, it does not limit whether the adhesive is only partially cured when encapsulated as applicant has argued or fully cured.



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Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ex. Mitchell, J.D.  
March 2, 2007



  
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